REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
16-02-2012	Briefing Slides	

4. TITLE AND SUBTITLE

Managing ESOH in R&D's – An Air Force Research Laboratory's Approach Hazard Analysis & Management Program)

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

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5d. PROJECT NUMBER

5f. WORK UNIT NUMBER
998307ZT

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)
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8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)
AFRL/RZS
5 Pollux Drive
Edwards AFB CA 93524-7048

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S NUMBER(S)
AFRL-RZ-ED-VG-2012-037

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited (PA #12161).

13. SUPPLEMENTARY NOTES
For presentation at the 243rd ACS National Meeting, San Diego, CA 25-31 March 2012.

14. ABSTRACT

This presentation is an overview of how Environment, Safety, and Occupational Health (ESOH) is managed in the research and development atmosphere of the Air Force Research Laboratory.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					Dr. Ashwani Vij
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**	SAR	21	**19b. TELEPHONE NUMBER** *(include area code)*
Unclassified	**Unclassified**	**Unclassified**			N/A

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THE AIR FORCE RESEARCH LABORATORY

LEAD | DISCOVER | DEVELOP | DELIVER

An Air Force Research Laboratory Approach To ESOH Risk Management

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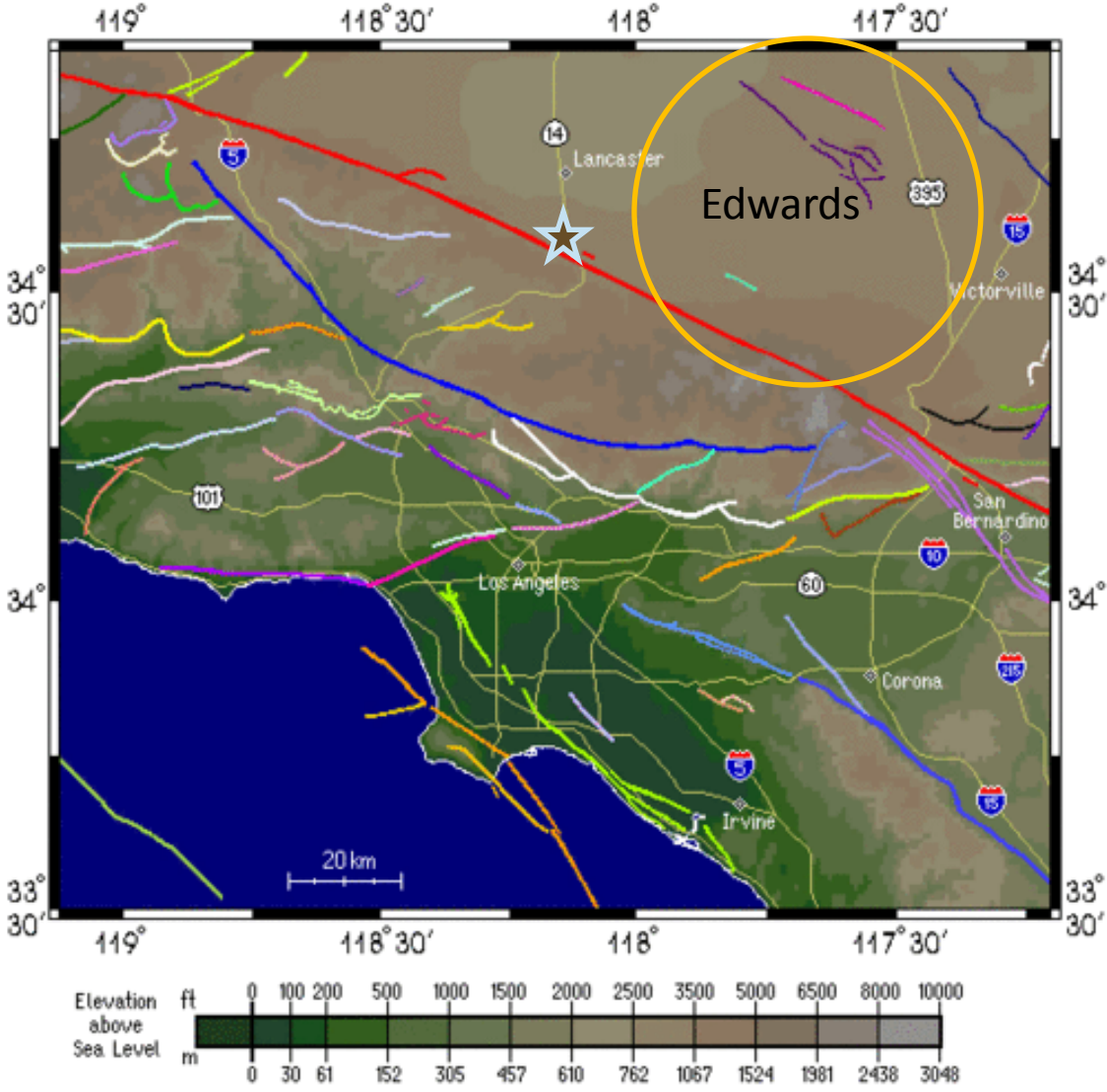
Environment, Safety & Occupational Health (ESOH)

Air Force Research Laboratory, Detachment 7

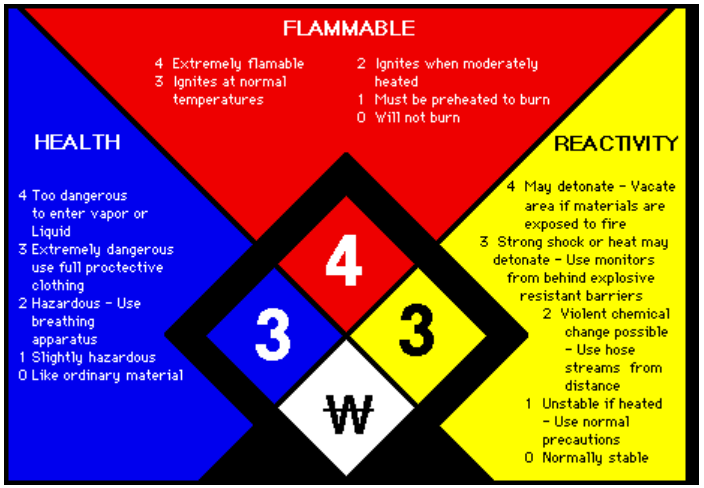
Edwards Air Force Base, CA 93524

Greetings from the Mojave desert



Where living can be hazardous

But today, lets talk about Chemical Hazards



Chemical safety in academia

Texas Tech Accident

GOVERNMENT & POLICY

Home » February 1, 2010 Issue » Government & Policy » School Labs Go Under Microscope

FEBRUARY 1, 2010 | VOLUME 88, NUMBER 5 | PP. 25 - 26

School Labs Go Under Microscope

Laboratory accidents in academia to be investigated by chemical safety board

Jeff Johnson

Texas Tech U

ICEBERG TIP A CSB accident investigation at the Texas Tech chemistry building could lead to a national examination of school lab safety.

One student, Preston Brown, 29, was seriously injured in the Jan. 7 accident and remains in critical condition, according to Eric Finley, a spokesperson with University Medical Center in Lubbock. Brown is being treated in the hospital's burn center, where he has been since the accident. Initially, press accounts said two students were injured; however, university officials say only one was hurt.

Brown received severe burns and lacerations to his face and hands when a mixture of nickel hydrazine perchlorate exploded during the afternoon accident in Texas Tech's chemistry building, according to a police report. University officials told CSB the accident involved the detonation of a high-energy metal compound. Texas Tech, the board reported, has an agreement with Northeastern University in Boston to study high-energy materials for the **Department of Homeland Security**.

UCLA Accident

Home » Latest News » Negligence Caused UCLA Death

LATEST NEWS

MAY 11, 2009 | VOLUME 87, NUMBER 19 | P. 7 | FIRST APPEARED ONLINE MAY 5, 2009

SAFETY

Negligence Caused UCLA Death

State safety and health agency faults university for training lapses, unsafe practices

Jyllian N. Kemsley

Courtesy of Naveen Sangji

Sangji

Negligence of lab safety by the **department of chemistry and biochemistry** at the **University of California, Los Angeles**, led to the Dec. 29, 2008, accident and subsequent death of researcher Sheharbano (Sheri) Sangji, says the state agency charged with investigating the incident.

In particular, the **California Division of Occupational Safety & Health (Cal/OSHA)** cited the department in a report released on May 4 for lacking both safety training and training documentation; failing to ensure employees wore appropriate personal protective equipment (PPE), such as lab coats; and failing to correct unsafe conditions and work practices identified in an Oct. 30, 2008, laboratory safety inspection.

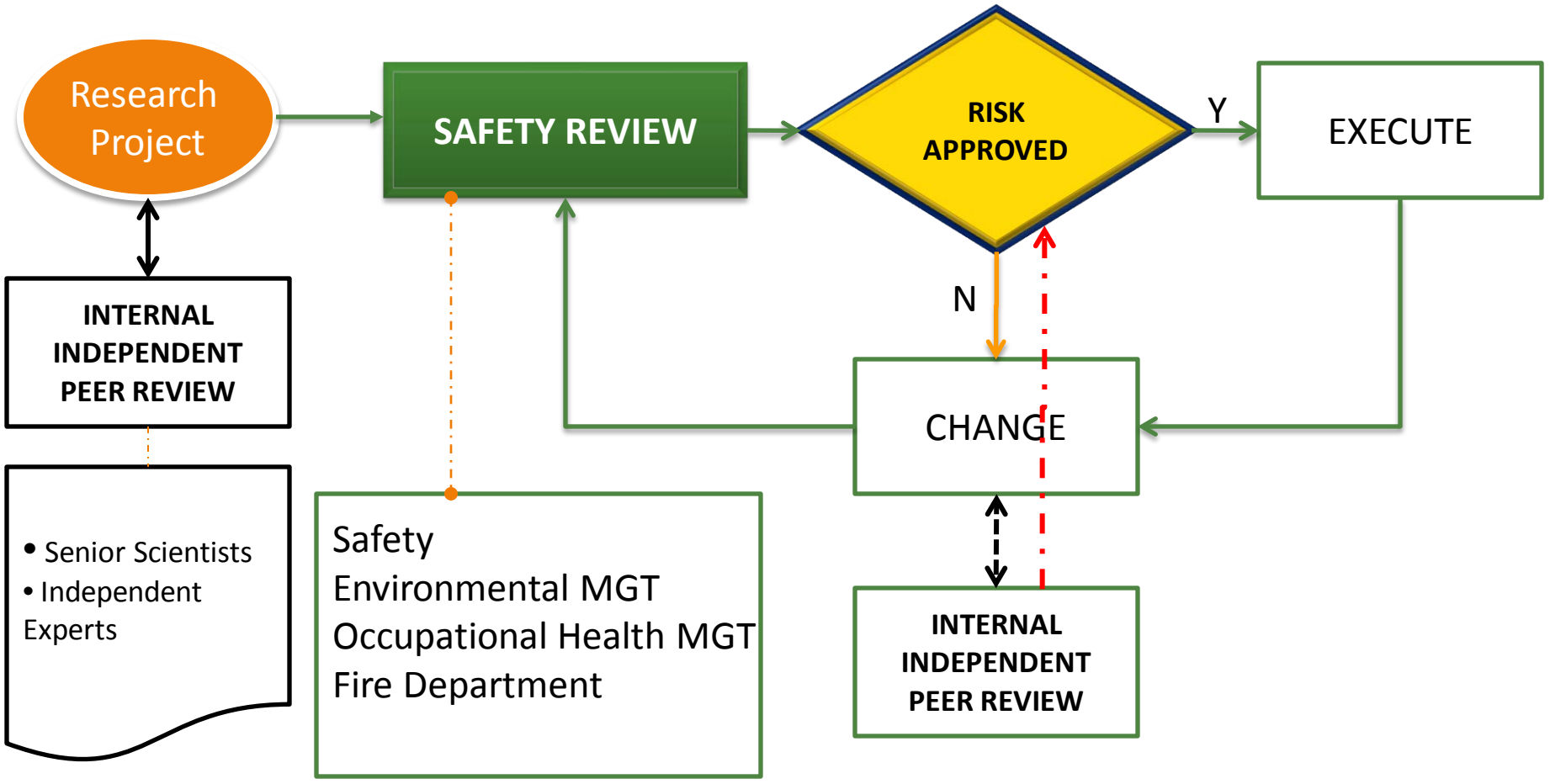
Among the findings of the October lab inspection was that PPE was not fully used in the lab in which the 23-year-old Sangji worked. She was not wearing a lab coat in December when pyrophoric material she was handling splashed and ignited her clothing.

UCLA Accident Consequences

- **Charges first of its kind in US**
  - Potential 4.5 years in prison
  - Potential $4.5 million fine to institution
- **Reference:**
  - Antelope Valley Press, Thursday, December 29, 2011

Potential Liability

Research approval process

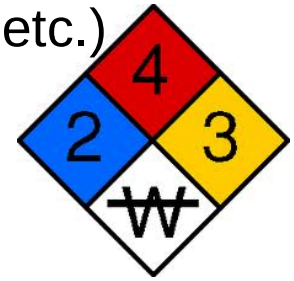


Risk Management

- Identify hazards
- Assess risk
- Develop & make control decision
- Implement risk controls
- Accept risk by appropriate authority
- Supervise and manage the change

Hazard Assessment

- **Hazard Assessment – a deeper insight into dangers**
  - Health (Carcinogens, mutagens, teratogens, irritants etc.)
  - Flammability
  - Reactivity (explosives, peroxide formers, etc.)
  - Special Properties (corrosives, pyrophoric, water-reactive etc.)
  - Cryogenics (cold burns etc.)
  - Rupture (Over pressure, glass vs. metal reactors etc.)



- **Have you considered any hazards not listed above?**
  - Unintentional oversight, complacency, overconfidence in subject

Consider Hazard consequences, your control measures and residual risk – Low/Med/High

Facility Evaluation

- **Evaluate Facility for:**
  - Electrical safety
  - Fire safety
  - Chemical safety
  - Hazardous Waste
  - Lab structure

- **Do you have *effective* Engineering Controls?**
  - Fume/bio hoods
  - Eye wash/showers
  - Fire extinguishers/suppression devices
  - Warning lights/signs
  - Emergency signs

A	Common Combustibles	Wood, paper, cloth etc.
B	Flammable liquids and gases	Gasoline, propane and solvents
C	Live electrical equipment	Computers, fax machines (see note1)
D	Combustible metals	Magnesium, lithium, titanium
K	Cooking media	Cooking oils and fats

PPE Evaluation

- **Personal Protective Equipment (PPE) and Clothing**
  - Face/Eyes (safety glasses, goggles, shields)
  - Body protection (shield, apron, fire retardant coverall/labcoat)
  - Respiratory system protection
  - Feet protection (absolutely NO sandals and flip flops, hard-toe if needed)
  - Hand protection (type of gloves – know the limitation of glove materials)
  - Hearing protection (ear plugs, mugs, etc.)

Resources: MSDS, NFPA, OSHA, ERG, Experts

Procedures & Training

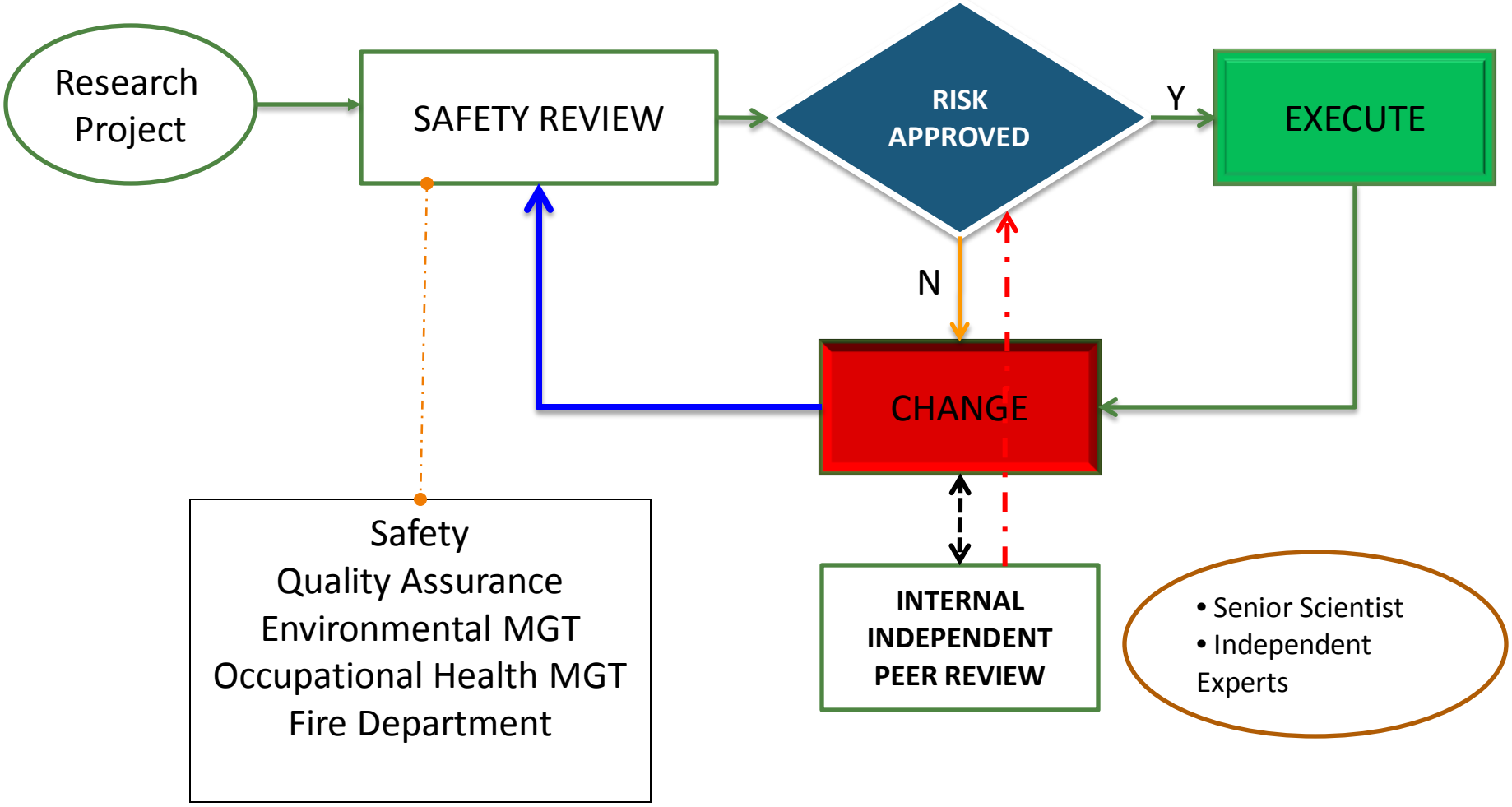
- **Procedures**
  - Lab Manual
  - Standard
  - Operating Instruction
  - Chemical Hygiene Plan (CHP)
  - Emergency and protocols
- **Class room training and CBTs**
  - CPR/AED/First aid
  - Fire extinguisher
  - LOTO
  - Confined Space
  - Safe handling of chemicals
  - Emergency evacuation/disaster management

Risk Assessment Matrix

HAZARD SEVERITY				
HAZARD PROBABILITY	**Catastrophic-I**	**Critical-II**	**Marginal-III**	**Negligible-IV**
Frequent-A	**1**	**3**	**7**	**13**
Probable-B	**2**	**5**	**9**	**16**
Occasional-C	**4**	**6**	**11**	**18**
Remote-D	**8**	**10**	**14**	**19**
Improbable-E	**12**	**15**	**17**	**20**

HIGH RISK (RHI 1-4)	Requires HQ AFRL/CC Commander's approval (Institution Owner)
MEDIUM RISK (RHI 5-9)	Requires no lower than Division Chief's approval (Institution Manager)
LOW RISK (RHI 10-20)	Requires no lower than Branch Chief's approval (Department Head)

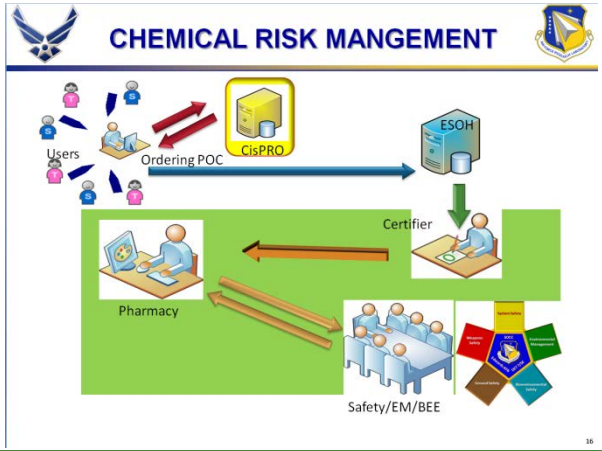
Research approval process



Managing Change

- **Track hazards and validate risk**
- **Changes**
  - Process
  - Equipment
  - Location
  - Personnel
  - Chemical

Human Factor
•Time is pressing • Budget is low • Outcome product is almost there



CHAS: Abstr. No. 22, this session, 3:20 PM

- **Manage Change is a process**
  - Important and Challenging
  - Oversight/Supervision
  - Establish Internal Protocols

CHEMICAL MANAGEMENT PROCESS

- **Annual review and safety permit expires**

Lesson Learned

- **Potential liability to individual and institution**
- **Establish safety practices and processes**
  - Evaluation of PPE
  - Training
  - Procedures/Manuals
  - Management Oversight/Supervision
- **ESOH is an Institution/Management's Program**
- **Risk management is part of the research culture.**

Acknowledgments

- Col. Michael Platt, Commander AFRL Det 7
- Mr. Michael Huggins, Division Chief
- Dr. Shawn Phillips, Deputy Division Chief
- Tim Auyeung, Det 7 System Safety Engineer
- Reggie Ching, Senior Systems Safety Engineer

QUESTIONS?

BACKUP

CHEMICAL RISK MANGEMENT